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# East Europe Report

## SCIENTIFIC AFFAIRS

No. 703

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## CONTENTS

BULGARIA

Bulgarian Achievements in Space Research Outlined
(Kiril Serafimov, et al. Interview; VECHERNI NOVINI, 11 Apr 81) ..... 1

CZECHOSLOVAKIA

Skoda, Csav Report on S&T at CPCZ Congress
(LIDOVA DEMOKRACIE, 10 Apr 81) ..... 5

Attention to Science and Technology, by J. Ludvik
Bringing Together Research and Production, by B. Kvasil

Briefs
New Anesthetic 9

HUNGARY

Background, Outline of National Medium-Term R & D Plan
(Lajos Szanto; MAGYAR TUDOMANY, Mar 81) ..... 10

Briefs
Monochloroacetic Acid Plant 26

POLAND

Antarctic Scientific Research Program Described
(Zbigniew Kowalewski; PRZEGLAD MORSKI, Sep 80) ..... 27

# BULGARIAN ACHIEVEMENTS IN SPACE RESEARCH OUTLINED

Sofia VECHERNI NOVINI in Bulgarian 11 Apr 81 p 4

[Interview with Corresponding Member Kiril Serafimov, chairman of the National Committee for the Research and Use of Space and director of the Central Space Research Laboratory (TsLKI) under the BAN (Bulgarian Academy of Sciences), Prof Dimitur Michev, deputy chairman of the committee, Senior Science Associate Ivan Arshinkov, the deputy director of the TsLKI from the same laboratory, and Senior Science Associate Stefan Chapkunov, director of the Space Instrument Building Administration and the director of the "Bulgaria-1300" Project: "The Contribution of Bulgarian Science"; interviewer, place and date of interview not given]

[Text] [Question] Corresponding Member Serafimov, during these important days, it is fitting to draw up an unique balance sheet of the success-crowned accomplishments of our space science. They are the prerequisite for its further development and what could be said more specifically about the immediate future?

K. Serafimov: It can be asserted that the TsLKI, like our serious space activities, are the fruit of the last two five-year plans which have strengthened the industrial and technical capabilities of Bulgaria and have thus become a true launching pad for space research. Our laboratory has achieved substantial fundamental-cognitive, technical, applied and prestigious results. Its potential in Sofia is focused mainly in three major basic space areas: space physics, satellite and missile instrument building and earth resources satellite technology. A substantial part of the TsLKI is our "Yu. Gagarin" base observatory near Stara Zagora with its director Senior Science Associate M. Gogoshev.

Widely known are the accomplishments of the TsLKI in space instrument building. Up to the present the laboratory has developed and built more than 30 space research systems and devices which have been lofted and successfully carried out their missions. Just at the First National Scientific-Practical Conference for the Use of Space Developments, our laboratory submitted 83 original inventions, circuitry systems, manufacturing methods, designs and so forth.

A larger portion of the products of our space instrument building is designed for the purposes of space physics in which area we have substantial world known scientific results. The TsLKI is also in the vanguard of the development of remote methods for the space and aircraft scanning of the earth. At the same time the TsLKI is the national coordinator of the practical applications of the aerospace inventions in a number of practical areas.

[Question] I would like to ask Prof D. Michev to tell in more detail about the Bulgarian developments and achievements in the area of earth resources technology.

D. Michev: Our nation has taken an active part in the development of remote sensing methods even from their inception, and in 1975 concluded a governmental agreement with the USSR for the use and development of aerospace earth resources technology.

The scientific research and design work in this area has been carried out in two directions: methods, systems and devices for studying the earth from space and the methods and equipment for the interpretation and use of multispectrum aerospace data and pictures.

In a short period of time in the two areas we have achieved important scientific and applied results. At present the analysis and interpretation of remote obtained multispectrum data and pictures have been introduced in many institutes and departments of our nation. They make it possible to solve various scientific and applied scientific problems and tasks in the area of geology, geotectonics, geomorphology, seismotectonics, geothermy, metallogenous zoning and forecasting, pedology, agriculture, hydrology, oceanology, environmental conservation and many others.

Earth resources technology also held a worthy place in the preparations for the flight of the first Bulgarian cosmonaut Georgi Ivanov. We developed an unique multichannel spectrometric system called "Spektur-15." It made it possible to record from the "Salyut-Soyuz" orbital scientific research complex the intrinsic radiation or the radiation reflected from various natural formations in 15 channels of visible and near infrared range. Here the data were recorded in a digital form on tape with the possibility of direct delivery to the electronic computer which would do the processing.

After the flight of the Soviet cosmonauts V. Lyakhov and V. Ryumin, the "Spektur-15" system was used to carry out multilateral research and experiments by international crews involving cosmonauts from Hungary, Vietnam, Cuba and Mongolia. Scores of thousands of spectrograms were obtained and at present these are being interpreted comprehensively by various specialists for the purposes of the different sciences and areas of the national economy.

[Question] The new concept of a transfer has arisen along the path of the constant increasing significance of space research in solving important practical problems. I would like Senior Science Associate Iv. Arshinkov to explain its content in Bulgarian terms.

Iv. Arshinkov: Transfer is a term which at present is assuming a new content for our nation. Space transfer is the turning of the achievements of space equipment and technology for ordinary, nonspace use in our daily life. This is many-sided and at times is difficult to note by nonspecialists. At this very moment millions of Bulgarian citizens are profiting from it in the form of space radio and TV communications with the USSR and the entire world, weather prediction, and the results of space remote scanning. These are the products of transfer which have already become part of our daily life.

It is indisputable that for creating equipment and devices capable of operating precisely and reliably over many years under unknown and often unpredictable conditions in space, the developers, designers and production engineers are often forced to seek out and successfully develop new ideas, principles and solutions. Having undergone the testing of the harsh cosmos, these fundamentally new or thoroughly upgraded designs and production methods provide an impetus for the rapid and sometimes unexpected development of analogous ground facilities, equipment and even production processes. The importance of transfer is also enormous for the further development of basic sciences.

Having started just a few years ago on an anyway significant level, we have already submitted proposals for introduction of a number of production methods, products and individual devices to the appropriate departments. We might mention the method of applying a glass-and-carbon surface as developed initially for the experiments of the "Bulgaria-1300" Project. This has great prospects in medicine as a substance with very good biological compatibility and is already being tested in the Medical Academy.

The list of our transfer proposals would include the technology for the photochemical working of three-dimensional metal parts which excel in great strength and lightness, a special cassette device for recording digital information on tape, microchannel optical amplifiers, devices for measuring air ionization, inflight simulators, high-voltage generators, multicomponent ferro-sensing magnetometers and so forth.

This list will grow in parallel with our successes in space research.

[K. Serafimov:] "The most immediate and urgent problems are those relating to our participation in celebrating the 1300th anniversary of the Bulgarian state. We will celebrate this jubilee by carrying out the major "Bulgaria-1300" space project. Under it two satellites will be launched into space. One will be the Bulgarian-Soviet project "Interkosmos--Bulgaria-1300." It will carry 12 of our systems, devices and pieces of equipment for studying the interaction between the magnetosphere and the ionosphere. The second will be under the Soviet space program, and in it we will provide two basic systems for earth resources technology and two service systems for on-board processing of the data and for their transmission to the ground stations."

[Question] The Bulgarian satellite will be equipped with Bulgarian devices, some of which are unique. What are they and what is their purpose?

St. Chapkunov: The carrying out of the scientific program falls chiefly on the Space Instrument Building Administration led by me. With the aid of the superior organizations (the BAN, the Ministry of Electronics, the Committee for Culture and others), a number of devices were developed some of which will be lofted for the first time into space. I must emphasize that the traditional accompanying measurements (of the electron and ion temperatures and concentrations) in terms of the level of instrument building have been brought up to world standards. And the Bulgarian invention of the "Four-Electrode Spherical Ion Trap" opens up new opportunities for this type of equipment.

As part of the scientific instrumentation, for the first time within the "Interkosmos" Program, the ultraviolet spectrum of atmospheric radiation will be measured.

The scanning photometer of the "EMO-5" instrument will provide spatial pictures of atmospheric radiation in the red oxygen line. By them the dynamics of the ionosphere will be studied and to a certain degree also the global atmospheric circulation at altitudes of over 200 km. Up to the present these have been very little studied.

Comparatively new for the TsLKI is the measuring of the electrostatic and magnetic fields. The developed "IESP" and "IMAP-1" complexes so surpass the existing analogous systems used under the "Interkosmos" Program that we have already received invitations to participate in complex space experiments involving international participation under this program up to the year 1986.

Using the excellent "OLSS" laser reflecting system developed at the Central Laboratory for Higher Geodesy, the next experiment will be carried out under the "Interkosmos" Program for penetrating this thorny area.

The vehicle by which the "Bulgaria-1300" Program will be carried out is a modified model of a weather satellite used in the Soviet scientific space program. This is an unique object which up to the present has no analogue under the "Interkosmos" Program.

[Question] Corresponding Member Serafimov, would you please recapitulate our discussion?

K. Serafimov: The advances of Bulgarian space science are indisputable, although we have given only a few of them here. The development of our victories in the research of space is a direct result of our extensive cooperation with Soviet science. The TsLKI works most closely with the Space Research Institute in the USSR and with other Soviet scientific and industrial organizations. Possibly one of the most substantial results of our joint activities has been the created single large Bulgarian-Soviet scientific-technical collective which is capable of solving the most difficult space problems.

Our devices have been lofted on the satellites "Interkosmos-8, 12, 14 and 19," on the heavy geophysical rockets "Vertikal-3, 4, 6 and 7" and on the Indian "Centaur-II" rockets. True high points of Bulgarian engineering are the two systems, the "Spektur-15" multichannel camera and the "Duga" electrophotometric device which up to the present have been operating on board the station "Salyut-6."

Naturally, the flight of the Bulgarian cosmonaut was the highest point of our space victories and cooperation with the USSR. Bulgaria was the sixth nation to send its citizen into space.

A very important result of our work has been the contribution of the TsLKI to strengthening the authority and prestige of our science and technology in the world and for developing in Bulgaria that new creative spirit which is characteristic for the space victories of mankind.

10272
CSO: 2202/11

SKODA, CSAV REPORT ON S&T AT CPCZ CONGRESS

Attention to Science and Technology

Prague LIDOVA DEMOKRACIE in Czech 10 Apr 81 p 3

[Summary of speech of J. Ludvik]

[Text] The general director of the Pilsen Skoda concern enterprise, J. Ludvik, announced in his speech at the congress that the production of goods by his concern had increased more than 32 percent, deliveries for capital projects 81 percent, exports to socialist countries 51 percent, exports to capitalist countries only 25 percent, and that productivity has increased 30 percent, which had brought a corresponding increase in earnings of 17 percent. Perhaps the greatest success was the startup of the first Czechoslovak 440 megawatt atomic power plant, with the help of Soviet experts. We also made operational several capital projects for the metallurgical, machinery, ceramics, and other sectors.

For the last year and a half we have not failed to be successful in international competition because of the technical sophistication of our equipment. We have won a number of such competitions, most recently from among 24 world-class firms.

Due to limitations in the facilities we have available for energy-related engineering, we focused our attention in a timely manner on exports in a field in which we had very little experience, or none at all, in exporting to nonsocialist countries. The first large contracts have been obtained for equipment for rolling mills and in other heavy engineering fields. At the start of the Seventh Five-Year Plan, we have contracts in hand for 80 percent more equipment to be shipped to nonsocialist countries than we produced during the Sixth Five-Year Plan.

Technical sophistication, however, is only a precondition for success on world markets. It is my view that the relevant central agencies must systematically create conditions for the producer in the commercial and political preparation of territories. In the Sixth Five-Year Plan, we began to implement the production of atomic energy equipment and reactors with a 440 megawatt capacity, placing our economic production unit among a relatively small group of such producers. This is a very sophisticated field from both a technical and a production point of view, whose mastery has required much effort and work both by us and our Soviet comrades. A number of difficult, above all, technical problems have been solved, while others still remain to be solved. We must constantly increase the number of specially trained nuclear welders, we must more rapidly introduce state-of-the-art welding technology (automated), with the objective of reducing the need for welders, but mainly to increase the quality of welded joints.

Nor will the completion of an additional program critical for the production and technological base enable us to outfit this base with enough speed to assure the fulfillment of future targets. In addition to the need to assure deliveries this year to the People's Republic of Hungary and for our own power plants at Jaslovske Bohunice and Dukovany, it is necessary to devote our full attention to the development work on a 1,000-megawatt reactor.

Directives for the Seventh Five-Year Plan assign substantially more dynamism to our enterprise in economic and volumetric categories than in the preceding period. Last September the party organs of our economic production unit and our economic management approved a program for the participation of the economic production unit in this development. This participation will focus on the following branches and sectors: in the first place, the production and delivery of equipment for the construction of atomic power plants. This is a critical task. Enough facilities must be made operational so that more than 3,000 megawatts of capacity will be on line by the end of the Seventh Five-Year Plan. Our second priority is the design of equipment making possible a reduction in energy consumption. The gradual implementation of this objective will conserve 4.5 million tons of coal per year by the end of the Seventh and beginning of the Eight Five-Year Plan.

We will have a major role in the delivery of electric locomotives and trolleybuses with reduced electrical-energy-consumption requirements for Czechoslovak transport and for other socialist countries.

The heavy engineering industry in Czechoslovakia and in a number of CEMA countries will receive deliveries from our economic production unit of highly sophisticated heavy machine tools, especially with programmable control centers. The basic principle of a maximum reduction in energy intensiveness in all our products has been integrated into the scientific and technical development of all departments.

Even now we have achieved positive results with machine tools, trolleybuses, locomotives, rolling mills, and with furnaces and turbines; the decisive results will come in the current five-year plan. Thyristor drives, developed in this economic production unit and constantly introduced into these fields, have achieved a 20-30 percent saving of electrical energy.

The most important area, the one on which critical attention is being directed, is scientific and technical development. What have been the main results in this area by the end of 1980, and thereby the starting points for the Seventh Five-Year Plan? The best results were achieved in production innovations, of which more than 420 were implemented. This showed up in the increased percentage of new products in critical sectors. For machine tools, new products made up 68 percent of the total, for electric locomotives 81 percent, for rolling equipment 60 percent, and for steam turbines 33 percent. The share of new products in exports increased substantially. The so-called 20-roller, a piece of equipment developed and tested here, belongs among the original designs in the cold rolling of special materials sector, and is 30 percent more productive than the American Senzimir, which has previously been imported.

## Bringing Together Research and Production

Prague LIDOVA DEMOKRACIE in Czech 10 Apr 81 p 3

[Summary of Speech by B. Kvasil]

[Text] B. Kvasil, Chairman of the Czechoslovak Academy of Sciences, Hero of Socialist Labor, made the following statements, among others, during his speech at the 16th CPCZ Congress.

In the preparation of the state plan for basic research for 1981-1985, which was developed in close cooperation with colleges and the whole implementational sphere, the academy proceeded on the basis of the experiences from the Sixth Five-Year Plan and an analysis of current shortcomings. The outlining of basic research priorities for 1981 to 1985, which it developed in close consultation with all colleges and the whole implementational sphere, had fundamental significance. The outlining of basic research priorities had basic significance.

Three projects are focused on the expanded utilization of our domestic raw-materials base. They are: exploring new, highly sensitive methods of geophysical research; the problem of mining inorganic raw materials at critical depths; and the comprehensive utilization of lignocellulose raw materials. Four projects are directed at the field of electronics, which has strategic significance for our national economy. The objective of these projects is to provide a basis for the development and production of crucial optical and electronic components for communication systems, for the improvement and significant expansion of the set of instruments and equipment for the requirements of qualitatively new electronics production, the theoretical bases for the development of robotics and cybernetics, and the foundation for the development of progressive computer memories.

An automated system for design and construction work in heavy engineering will be developed with the help of computer technology. In health care, the results of three projects will be implemented, projects which were focused on improving the diagnostic and treatment resources and techniques for the prevention of serious diseases of modern society, including the use of peptidic regulators of life processes, and the preparation and processing of specialized polymers applicable to medical practice.

The outputs of three projects are earmarked for agriculture. They concern the integrated protection of cultivated plants, the protection of large-scale livestock operations from parasites, and the development of techniques for the managed reproduction and fertility of livestock. The outputs of projects devoted to the mastery of new biological technologies based on microbiological processes, gene manipulation, and the utilization of immobilized biological systems are earmarked for use in agriculture, health care, and other areas of social practice. Two projects are being devoted to the preservation of the environment. The first crucial trend--the comprehensive utilization of raw materials by their consistent valuation--is concentrated on the consistent application of a rational approach to the management of domestic raw materials. Its principal features are, in particular, the exploitation of raw materials at the upper limits of technological capacity, the repeated use of valuable components of the raw materials base, and the comprehensive use of mined materials and industrial wastes. Additional aspects of this trend are the broad usage of materials from domestic nonore raw materials, an orientation

toward highly qualified, low-volume technological products made of valuable materials with specific properties, as well as the utilization of nontraditional methods of energy extraction, even from nontraditional sources.

The second of these outlined critical trends is the electronicization and cybernetic ization of processes in the national economy, leading to its greater efficiency. The axis of this trend should be an increase in operational reliability and a decline in acquisition costs, and a high level of innovation of microelectronic components and systems.

In addition, it is necessary to assure, above all, the accessibility of a corresponding volume and mix of components and equipment, and to develop their domestic production. At the same time we must proceed on the basis of specialization in narrow, highly coordinated international cooperation among the countries of the socialist community.

The third trend is the application of biogenetic materials and biologizing technologies for an expansion and evaluation of biotic resources, and rests on the gradual mastery and rational utilization of the reproductive processes present in nature. Its characteristic feature is the energy-conscious and economically sound application of the principles of new biological technologies and the orientation of the production sphere toward the consistent utilization of raw materials of microbiological, plant, and animal origin. This feature is closely tied to the preservation of the environment, because it leads from processes whose wastes can return to the natural cycle, to processes which generate no wastes.

We consider the closer integration of the Czechoslovak production structure with contemporary science t· be the path to the essential constant increase in the efficiency of the national economy. It is impossible, however, to achieve systematic and major changes in this area without the central establishment and development of stable strategic, scientific-technical directives. Outlining these objectives is a fundamental starting point for considerations about optimizing the structure of our national economy. At the same time, promising possibilities for the development of state-of-the-art production technologies at a world level depend both on the current results of basic research and on the target projects which are established. Science is powerful; it is not, however, omnipotent. For this reason the completely justified draft of The Main Trends of Economic and Social Development for 1981-1985 provides for the creation of the conditions for the consistent application of the results of scientific and technical progress at all levels of management in the whole chain of social and economic practice. If we assert that science becomes as immediate material force, and that production is the process of the materialization of science, then new elements connected with this development inevitably come into conflict with several stereotypes of planning and management.

In conclusion, I would like to emphasize that the employees of the Czechoslovak Academy of Sciences are aware that the success of our economic construction in the complex and demanding conditions of the eighties, the fulfillment of our social objectives and of our international commitments will depend to a great extent on a substantial increase in the sophistication and utilization of science in the whole life of our society. The academy is also aware of its responsibility for fulfilling the tasks which fall to it from the resolutions of our congress.

9276
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## BRIEFS

NEW ANESTHETIC--Production of the modern inhalation anesthetic Anecotan, which was discovered by the Department of Chemical Technology of the Chemical-Technological College in Prague, has started at the national enterprise Leciva in Mecholupy. One of its kind within the CEMA countries, Anecotan is manufactured exclusively from domestic raw materials and has a strong export potential. The planned production capacity of 50 tons per year represents a yearly income of Kcs 2.5 million for the national economy. The anesthetic will be used in obstetrics, stomatology, endoscopic examinations, first aid treatment and painless transportation of the sick and injured persons. [Prague ZEMEDELSKE NOVINY in Czech 7 May 81 p 6]

CSO: 2402/60

BACKGROUND, OUTLINE OF NATIONAL MEDIUM-TERM R & . .AN

Budapest MAGYAR TUDOMANY in Hungarian No 3, Mar 81 pp 195-205

[Article by Lajos Szanto]

[Text] Since 1971-1972, the National Long-Range Scientific Research Plan (OTTKT) is a major instrument in the systematic guidance of scientific research and technical development in Hungary. On the one hand, this document of the government's science-political strategy contains the major principles of governmental research and development direction -- based on the scientific-policy guidelines promulgated by the MSZMP KB [Central Committee of the Hungarian Socialist Workers' Party] -- and on the other hand it codifies the gigantic research program embodied in 18 major sociological, economic, cultural, and scientific tasks (seven main research programs and 11 research target programs) which absorb the largest portion of our research and development efforts even today.

Although the plan has played an important role in the orientation of research and development for almost ten years, the planning system that has evolved earlier becomes increasingly unsuitable for today's needs. In spite of a number of initiatives, the desirable interaction and harmony between the main trends of socio-economic development, the science-development trends, the long-range goals of scientific research, international cooperation, and domestic research has not developed until recently. The economic development plans had only an indirect effect for a long time. All these factors indicated the need for the modernization of the whole system of research and development planning (primarily the relationship between long-range, medium-range, and short-range plans and the coordination of top-level, medium-level, and local-level plans).

A very important and in many respects novel step in the modernization of the planning system was the preparation of the National Medium-Range Research and Development Plan (OKKFT) for the years between 1981 and 1985.

The Council of Ministers directed the preparation of the plan during the spring of 1978, and the Science-Policy Committee developed the detailed program for it. The planning work, which has engaged many intellectual forces for almost three years, has been completed by the end of last year: The OKKFT is now a reality. The Science-Policy Committee has debated the plan-documentation project last November, and the Council of Ministers approved and promulgated the new medium-range research and development plan under Decree 2025/1980.(XII.22).

The purpose of this article is to describe the aims and major features of the OKKFT and to present two most important sections of the plan document.

## I. The Aim and Major Features of the OKKFT

It has been a characteristic feature of our research-planning system for a long time that the major research and development tasks and priorities have been formulated only for the long term, and that the tasks are not coordinated with the medium-range planning of the national economy. Nor has there been a national medium-range research plan based on the long-range plan. Yet, both socio-economic development and the scientific life both need a medium-range action program, primarily to ensure that domestic research and development directly serves the tasks of the building of a socialist society.

With the aim of improving this situation, the OKKFT was conceived with three goals in mind:

a) Bringing the economic and science policy into closer harmony and coordinating them better;

b) Contributing to the successful accomplishment of the goals of the Sixth Five-Year Plan and to the development of the Seventh Five-Year Plan, with special emphasis on the research and development tasks aimed at the modernization of the production structure and the improvement of the foreign-trade balance;

c) Improving the efficiency of research and development (improved emphasis on quality, and better utilization of the principles of selection and reserves).

The OKKFT approaches and deals with the goals and the solution of the tasks in two ways. First, it orients the totality of research and

development by offering guid lines, concepts, and financial framework; second, it organizes specific activity with its programs raised to the national level. Accordingly, the plan has three sections. Section I briefly analyzes the major research and development experiences of the completed Fifth Five-Year Plan and outlines the major science-policy goals for the period covered by the Sixth Five-Year Plan. Section II contains the research and development programs which are highlighted at the national level, stating their definition, goals, and those responsible for their performance (at the present time it starts out with 15 programs, of which 13 deal with direct economic goals). Section III sets down the amount, source, and utilization ratio of the funds to be expended on research and development during the period covered by the Sixth Five-Year Plan. (During the plan period, 17 billion forints can be spent on the 15 programs from the total research and development budget of 104 billion forints.) In addition, it designates some general principles concerning the execution of the plan.

The plan document itself was completed in three stages and features the principle of gradual approach and subsequent specificity; it was prepared in parallel with the development of the Sixth Five-Year Plan by experts, associations of experts, and institutions.

During the first stage, two so-called econo-political part concepts were prepared, both of which served economic planning and the establishment of the foundations of the OMKFT: "Main Directions of Scientific Research Activities" setting down the priorities for the period covered by the Sixth Five-Year Plan in the areas of fundamental and applied research, and "Technical Development Policy" describing the priorities for the selection of research and development activities directly related to the accomplishment of economic and social goals.

During the second stage, the program proposals that appeared appropriate were compiled and the concepts of the individual programs were outlined. Initially, there were more than 30 programs, and of this juries at various levels selected those that remained in the running by local debates and on the basis of their meeting the prescribed criteria. It was during this stage that the science-policy goals were formulated for the plan period, representing the contents of Section I.

During the third stage, the main activity involved the concept of the Sixth Five-Year Plan, now under preparation, its coordination into the overall scheme, and concretization of the plan. This stage occupied all of last year. Many analyses and calculations were made during this stage to make the plan reliable, especially on the basis of the trends in material and intellectual resources, which have been surveyed.

Precisely because the OKKFT represented a novel approach, no conventional methods could be used in its preparation. In several major areas, the proper approach had to be developed while the work went on. These approaches contributed to the final flavor of the plan.

a) The 15 programs of the plan (as the term itself denotes) formulate the medium-range research and development tasks as precisely as possible. This is the first major try since 1968 to use program-like planning in high-level research supervision.

   In all cases, an OKKFT program means a major activity aimed at achieving a specific social, economic (primarily industrial or agricultural) goal toward the building of socialism, usually by means of complex research and development.

   In addition to the general definition, the programs must meet four criteria:

   - The program cannot be carried out solely from the resources of a single governmental organ and is usually covered by several jurisdictional units of the state;

   - The program necessitates the coordinated cooperation of several scientific disciplines and user sectors;

   - The planned result of the program can be regarded as being economical since -- also considering the international development trends of science and technology -- the expenditures will be recovered at the national level after the results have been implemented;

   - The prerequisites for the execution and implementation of the program exist or can be realized by true development of the research and development base or user potential.

b) The OKKFT is a new means in research and development planning for the additional reason that the number of programs changes as time goes on, that it represents an open system, and that such system can be adapted to newly emerged tasks, goals, and needs.

   No doubt, some of the programs included in the OKKFT at this time will be successfully completed within the plan period on the basis of the results of the research and development work. It is also certain that some other programs would be removed from the OKKFT because of lack of

results or changes in economic conditions. Other changes could also take place. For example, the preparation of a unified socio-political concept aimed at increasing the efficiency of energy utilization is currently in progress. Work is also underway on the development of programs aimed at improving the system of public education. Once they have been thoroughly evaluated, these projects might be included in the plan. A decision has been rendered on the development of a program aimed at the advancement of medical biology and bioengineering.

c) The execution time of research and development programs included in the OKKFT may be more or less than five years, and this time may or may not coincide with a five-year plan. In this sense, therefore, we cannot speak of planning related to conventional plan periods: completion and result evaluation will take place according to the time schedule of the individual programs.

d) Some of the OKKFT programs are based on individual OTTKT highlights or target programs of major importance, and this will remain so in the future also. This why the long-range OTTKT and the medium-range OKKFT must be coordinated clearly -- an area which so far has not been clearly defined.

The OTTKT should, in the future, deal with long-range aspects of domestic scientific research, and outline research and development "areas." Depending on the progress of the research, programs could be developed in certain areas -- if these programs permit the solution of specific economic goals -- for inclusion in the OKKFT. It is thus evident that the long-range research plan will be a major, but not the sole, source of the OKKFT. There could, and will, be studies -- not specifically stated in high-level plans -- which promise important economic achievements, necessitating their conversion into an OKKFT program. This new relationship between long-range and medium-range planning meets the needs of research better than the approach employed earlier. Long-range planning will be aimed at defining major trends -- making better use of forecasts than before -- while medium-range planning will be concerned with action programs for individual major activities.

e) An important prerequisite for the systematic and successful accomplishment of OKKFT programs is an effective supervision of the work. Each program is assigned to an individual who is given overall responsibility for it, and it is the right and the duty of these individuals to establish an optimum supervision mechanism for each project, primarily based on existing program bureaus and designated basic institutions in the research system.

The main usefulness of supervision is expected to be that it ensures the allocation of funds, ensures the implementation of the results without losses, and ensures better and more systematic utilization of the potentialities of international scientific and technical cooperation.

A potentially useful way for the operative management of some programs is the establishment of target-oriented R/D associations. A target-oriented R/D association could also enable a novel and systematic combination of intellectual and material resources with the result that better division of work and profits among the participating institutions would ensue.

f) Financing plays a major role in the management system. According to current views, various sources of funds will be used in various ways for the financing of the projects. Basic funancial funding will come from state sources (ministries and organs of national jurisdiction). The enterprises concerned will also participate in the financing of programs of direct economic interest. The individual responsible for the program will establish multilateral agreements within a framework agreement for financing. Bidding will be one way for obtaining access to funds.

II. Science-Policy Principles and Major Science-Policy Goals to be Implemented in the Sixth Five-Year Plan

Scientific research took place in recent years under favorable social conditions and variable economic conditions. Its effects were increasingly felt in social and economic areas, and it contributed toward economic development and better understanding of social phenomena and processes. Activities closely related to economic advancement received greater emphasis in research and development activities. The fact that the machinery complement of the enterprises has been modernized indicates an improvement in the technological level. More modern materials and products were manufactured, and and the production of industry sectors requiring progressive research and development increased. However, we have still not succeeded in raising the level of technological development as much as we have wanted to. The differential in technological level between industrially developed countries and Hungary has not diminished. Modernization of the production structure takes place slower than we desire. The enterprises still do not implement modern foreign and domestic product innovations to a sufficient degree, and the technical development priorities outlined in the Fifth Five-Year Plan still do not manifest themselves sufficiently.

The relationship between research, production, and marketing activities is unsatisfactory. The percentage of the funds expended for basic research has decreased. This has an undesirable effect on the balanced development of scientific potential and on the creation of original scientific results.

Expected Trends in Economic and Financial Conditions

The primary econo-political goal of the Sixth Five-Year Plan is the gradual improvement of the equilibrium of the economy, the strengthening of the economy, the improvement of efficiency and competitive status, and the unfolding of development based on quality factors. In order to achieve this goal, we must ensure that scientific research and technical development become more productive, and we must adapt ourselves better to the trends of international economic and technical development. Approximately three percent of the national product may be allocated during the plan period for scientific research and technical development. Based on a 14-17 percent growth of the national product in five years, this represents the sum of 103.8 billion forints.

The technical development fund — which may be used in large-scale agricultural enterprises -- represents a novel factor among the major sources of financing. Another new feature is the procurement of facilities required for technology modernization from advanced funds, within specified limits. It is anticipated that tensions would develop primarily in the area of investment-fund sources within the total funding of research and development.

As a result of the internal ratios of research and development funds, it is likely that the research institutions funded by public monies will become increasingly interested in performing contracts for industrial research and development projects. This contributes toward the improvement of the direct relationships between industry and research, and the manifestation of the target-oriented approach. However, we must be careful to ensure that no shift in priorities develop in the field of research which is undesirable for scientific advancement, and that the role of basic research — which is important for long-range advancement and scientific growth — does not diminish in favor of current studies in these institutions.

Effects arising from the expected conditions of society and economy affect scientific research and technical development in many ways, and create changed demands and conditions for science policy. During the plan

period, we must revise the planning practices of scientific research and technical development, the decision-making system, the regulating mechanisms, and the management methods in the light of changes that may take place in the social and economic conditions.

## Technical-Development Priorities and Main Research Trends for the Plan Period

Research and development activities during the plan period must contribute toward the accomplishment of the primary goals of the economic plan and social advancement. The expansion rate of the funding of development must be reduced, and at the same time the effect of science and technology on economic development must be strengthened. The contribution of research and development to the creation of the national product must be increased, and must be utilized toward the rationalization of the production structure and toward the increasing of the efficiency of work.

The technical development priorities and the internal development trends during the plan period determine primarily the main research directions in the years to come. The economic tasks that emerge and the tasks outlined earlier in the National Long-Range Scientific Research Plan (OTTKT) determine the program.

The following are the technical development priorities:

- Developments aimed at improving the technical level, quality, and economical manufacture of the products;
- Developments aimed at improving the effectiveness of the utilization of materials and energy sources;
- Developments aimed at the modernization of the technologies — with emphasis on automation and material movements;
- Developments aimed at the economic manufacture of blanks, parts, subassemblies, and complete technologies and complex production systems.

Practical implementation of the results of research and development aimed at the accomplishment of these goals is of decisive importance in the economy.

The main directions of scientific research are aimed at providing a foundation for long-range development, while keeping the technical development priorities for the medium term in mind:

- Research aimed at the effective exploitation of our natural resources, their rational utilization, and economical allocation;
- Research aimed at the production of energy, effective management of energy and energy sources, and efficient utilization of energy;
- Research in the field of materials engineering;
- Research aimed at the development of machinery manufacture;
- Agricultural, biological, technical, chemical, and environmental research aimed at increasing agricultural yields and economical food production (including all basic research required);
- Building a developed socialist society (including development of economic management systems, elucidating the role of Hungary in the world economy, study of social structure and value systems, stratification trends, trends in the way of living, schooling and public education systems).

The technical development priorities and main research directions for the period covered by the Sixth Five-Year Plan orient the specific major tasks of the management of scientific research and technical development.

The medium-range programs of the plan could offer effective help in the accomplishment of the goals of the Sixth Five-Year Plan and the solution of the socio-economic tasks facing us in the future farther ahead. Central direction of research and development, following the priorities and main directions established, must emphasize the accomplishment of these featured goals. At the same time, it must be ensured that the percentage of basic research represent about 11-12 percent of the total research effort (the percentage may vary from one institution to the other). Above-average support must be given to major research projects which command international recognition, are of high level, and deal with modern scientific matters. Means should continue to be provided to ensure that major scientific advancements are monitored.

Insofar as research in universities is concerned, emphasized support must be given to studies aimed at providing proper educational level. In addition, the prerequisites for high-level, synthesizing, and sophisticated basic studies should be provided. The universities must be increasingly involved in the accomplishment of featured programs by research and development contributions. The use of bidding methods in deciding on the allocation of funds should be extended.

## The Institutional System of Scientific Research and Technical Development

The organization of the work for society, as well as the efficiency of the economic activity must also be helped by modification of the organizational framework of technical development and research activities during the period of the plan. The economy has less and less investment potential as time goes on, and the importance of the more economical utilization of the existing resources becomes more and more important. Enterprise development policy, as well as enterprise research, development, and innovational activity also become increasingly important in all areas; they are based on enterprise initiative and competition. In the course of these activities we must increasingly use the methods of licensing and adaptation of know-how to supplement the enterprises' own research potential.

The research-institution network must be modified to achieve these goals. The measures aimed at this problem must be implemented in such a manner that the conditions for enterprise innovation improve, that the relationship between scientific research and higher education is strengthened, that the segregation of the research institutions is reduced, and that the productivity situation of the research institutes improves. Institutional forms that match innovative activity and scientific research must be established. The relationships among research, development, production, and marketing activities must be improved by providing the appropriate institutional system and by promoting various types of research/production associational formats.

## International Scientific Relations

The primary directions and goals of international scientific relations and cooperation must be harmonized with the major research/development tasks of the next plan period (for the country). All research institutions and researchers must be given the opportunity to participate in the basic means of maintaining international relations: exchange of periodicals, publications and books; personal relationships; conferences of experts; participation in congresses; acquisition of computer data bases, and so forth.

The basic feature of the cooperation with the socialist countries must be collaboration with specific goals in mind. This should emphasize areas capable of contributing to the effective realization of domestic social and economic goals or to the performance of major joint scientific and technical goals agreed upon among the socialist countries of the world.

The number of less important cooperation projects must be reduced, and there should be less formalism in international relations.

The primary goal of scientific and technical cooperation with developed capitalist countries is the acquisition of modern technologies, methods, and management systems required in the next plan period for domestic economic development, as well as the promotion of the training of the experts needed for the further development of these technologies, methods, and so forth. Within the framework of the cooperation our aim should be to establish scientific and technical cooperation also. Such relationships should prepare the ground for the acquisition of licenses and production collaboration in the future.

III. The Programs of the National Medium-Range Research/Development Plan

The Council of Ministers promulgated the following designations, goals, and responsible individuals for the current programs included in the OKKFT:

1. Coal processing, coal refining, and promotion of coal firing

The goal of the program is to meet the needs of coal users better, to make the utilization of coal more efficient, and to develop the technical measures required for expanding the number of coal users. Within this general framework, the research projects of the program are primarily aimed at replacing imported energy sources (such as coke, coke-coal, and hydrocarbons).(This will later become a basic project in the program for "Medium-Range Research and Development Tasks of Energy Management," now under preparation.)

The minister of industry is responsible for the program.

2. Research and development tasks of machine-manufacturing technology

The goal of the program is to accelerate the acquisition of knowledge required for accelerating the development of machine-manufacturing technology in selected areas, to ensure the quick industrial introduction of the results, to establish the technological complement required for a modern product line, and to ensure the effective use of the investment funds. In addition, the program is also aimed at contributing to economic use of materials, energy, and personnel by methods of machine-manufacturing technology.

The minister of industry is responsible for the program.

3. Development of the manufacture of spare and replacement parts by the machine-manufacturing industry

The goal of the program is to promote the manufacture of items required for selected categories of equipment (oil-hydraulic systems, pneumatic systems, joining elements, general industrial fittings, transmission drives, liquid pumps, roller bearings, clutches, springs, industrial chains, and so forth) to improve the production and technological structure of domestic machine manufacture, its economy of operation, its technological level, and its ability to compete on world markets.

The minister of industry is responsible for the program.

4. Research and development in the field of microelectronic parts, technologies, and basic-materials research

The program emphasizes the development of microelectronic components which determine the rate of advancement in electronics, the reduction of import from capitalist sources, the improvement of the competitiveness of the electronics industry, and the catching up from our backwardness in the relevant technology. The program will ensure by means of license and know-how acquisition, as well as by means of domestic research and development, the mass production of solid-state circuits, experimental production of special microelectronic components based on domestic research and development, and the establishment of a concentrated microelectronic research and development base in an infrastructure common with the mass-production facility.

The general secretary of the MTA [Hungarian Academy of Sciences] and the minister of industry are responsible for the program.

5. Research and development in the field of telecommunication equipment with special emphasis on system development

The goal of the program is the utilization of the accomplishments of microelectronics and computer technology for research/development and manufacture introduction of digital, high-reliability, low-consumption switching and transmission equipment adaptable to the domestic infrastructure and capable of meeting export requirements. As a result of this program, it will become possible to manufacture telephone, television, telex, and data-transmission systems of the digital type for international, national, and rural areas, which could also be sold on capitalist markets.

The minister of industry is responsible for the program.

6. Research and development in the field of computer-technology application systems

The goal of the program is, first, to promote the application of computer-technology equipment and methods by development of prototype systems in the major areas of the national economy, and, second, to increase the percentage of intellectual work in the domestic manufacture of computer-technology equipment in such a manner that systems capable of solving complex application problems are created, which can be marketed more advantageously.

The chairman of the Interdepartmental Computer-Technology Committee and the chairman of the Central Statistical Bureau are responsible for the program.

7. Development of Research on Original Drugs

The goal of the program is to develop the domestic export-oriented pharmaceuticals industry by the required research and development activity, and to introduce new original drugs which can be advantageously marketed over the world. Featured themes in the program are aimed at meeting the most important therapeutical requirements. Domestic research in these areas has been major and internationally acclaimed in the past, and we now have traditions, as well as scientific and technical expertise, so that the chances are good that we will develop effective drugs for which we will obtain much more foreign currency than from the sale of reproduced preparations.

The minister of industry is responsible for the program.

8. Research and development in the field of pesticides

The goal of the program is to advance the manufacture of pesticides and their intermediate products at a faster rate, and to make us internationally competitive in this field. Meeting the long-range plans makes it necessary that the Hungarian pesticides industry significantly modernize its product structure, and that it introduce the manufacture of an increasing number of original and patentable products.

The minister of industry is responsible for the program.

9. Development of grain production

The following are the goals of the program:
- Increased utilization of the potential productive capacity of commonly used species;
- Improvement of the growing conditions;
- Development of new species and hybrids, based on a new genetic background, capable of adapting to extreme climatic conditions;
- Development of complex production technologies based on modern mechanization for further increasing the specific productivity, and further upgrading these technologies.

The minister of agriculture and food is responsible for the program.

10. Meat and milk production based on mass fodder and secondary products

The following are the goals of the program:
- Expanding the mass-fodder base, which is backward;
- Improving grassland management;
- Expanding the export-goods base of ruminant animals by means of more efficient utilization of the fodder and secondary agricultural products.

The primary task is the development of cattle, sheep, and goat husbandry for meat and dairy-product production, based on complex mass-production techniques, which become effective already during the present five-year plan period and which can be introduced starting 1985.

The minister of agriculture and food is responsible for the program.

11. Research and development aimed at increasing the safety of operation of nuclear power plants

The goal of the program is to establish a coordinated complex research and development base to support the safe operation of the nuclear power plant in Paks, to dependably survey the short- and long-range risks of the domestic nuclear-energy program, to contribute toward the reduction of the risks, and to act as a consultation facility for alleviating the consequences of any accident.

The general secretary of the MTA and the minister of industry are responsible for the program; the chairman of the National Atomic Energy Commission is responsible for coordination.

12. Regional environmental study of Lake Balaton

The goal of the program is to preserve the environmental state of the Lake Balaton area and to provide a scientific foundation for the development program mandated by government decree. In order to accomplish this goal, the sources of environmental contamination must be discovered, methods must be developed for preventing environmental contamination, and the self-purifying capability of the lake and its natural surroundings must be increased.

The chairman of the National Environment and Nature Protection Bureau is responsible for the program.

13. Research in the field of materials science and technology

The following are the goals of the program:

- Studies aimed at the development of the foundations of the production of high-purity metals, metal oxides, and single crystals from domestic ores and secondary raw materials;
- Determination of the technological development directions for the production of these materials;
- Exploration of the uses of the new materials.

The general secretary of the MTA is responsible for the program.

14. Research and development in the field of the industrial technology of protein production

The goal of the program is to develop technological solutions to ensure that the domestic protein base for both nutrition and animal feeding can be economically expanded, and at the same time the importation of fodder protein can be reduced. Proper production and product development can also result in the manufacture of internationally marketable, versatile products. This would, on the one hand, increase the efficiency of protein production from animal byproducts and, on the other hand, expand the range of nutritional protein sources with better quality and biological value.

The chairman of the OMFB [National Technical Development Committee] is responsible for the program.

15. The organizational structure of our economy

The following are the goals of the program: Description and critical analysis of the organizational structure of our economy, determination of the causes for its development, preparation of conclusions, recommendations, and proposals for the development of the organizational structure, and improvement of the distribution of tasks, responsibilities, and authorities.
The following major themes are involved:
- Problems of the organizational structure of the enterprise sphere;
- Problems concerning the relationship between the state supervisory apparatus for the economy and the enterprises;
- Problems related to the internal organizational structure of the state supervisory apparatus for the economy and its interfacing with the enterprises;
- Status of regional Party committees and enterprise Party committees in the organizational structure of economic management.

The general secretary of the MTA is responsible for the program.

The next task of planning is the finalization of the programs, the precise surveying of the participating research institutions, and the start-up of the research/development work. Evaluation of the results, a comprehensive information system, and financial considerations are among the subsequent tasks.

Taking into consideration the expected trends of the relevant conditions, we expect primarily a strengthening of the relationships between the socio-economic environment and the research/development sphere. The plan anticipates that the receptivity of the enterprises to innovation and their readiness to innovate -- based on a regulator, system that will be modernized to meet the economic needs -- will increase, which will have a favorable effect on research and development activities. It also anticipates that the structure of the research and development base -- developed historically -- will become more modern, and that the internal reserves can be mobilized for the accomplishment of the designated goals.

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## BRIEFS

MONOCHLOROACETIC ACID PLANT--A monochloroacetic acid plant is to be completed at the Nitrochemical Works [NITROKEMIA] by late 1982. Plans and equipment will come from the Sumitomo firm of Japan. The new plant will deliver 99 percent pure monochloroacetic acid to five pharmaceutical firms and plant protective agent manufacturers. Two-third of the chemical will be processed at NITROKEMIA. This will permit increased export of plant protective agents and herbicides to the USSR in the form NITICID. [Budapest NEPSZABADSAG in Hungarian 28 Apr 81 p 9]

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## ANTARCTIC SCIENTIFIC RESEARCH PROGRAM DESCRIBED

Warsaw PRZEGLAD MORSKI in Polish No 9, Sep 80 pp 63-66

[Article by Lt Cmdr Zbigniew Kowalewski: "Participation of the Polish Navy in Realizing the Antarctic Scientific Research Program during the 1976-1980 Period"]

[Text] The main reason for including Polish science in the scientific investigations of the Arctic and Antarctic polar regions was to form future bases for exploiting the natural riches of these regions by Poland. The results of 5 year's of research shows that the polar regions can be used more extensively as sources of raw material and food for Poland. However, the eventual exploitation of these regions for the needs of the national economy must be preceded by scientific research documenting Poland's presence in these regions and appropriate Polish input in the international efforts in researching the Arctic and Antarctic areas. This is confirmed by the extensive discussions now taking place among members of the organization of the Antartic Treaty Signatory Nations regarding the development of a fishing convention and the bases for future exploitation of Antartica's mineral wealth.

Many scientific results have already been achieved. In addition, a research team has been trained to conduct scientific research in the polar regions. As a representative of Polish science, the activities of the Polish Academy of Sciences [PAN] produces many positive aspects for Poland, internally as well as on the international forum. Thanks to the construction and activation in Antarctica of the Polish Scientific-Research Station, Poland is now a permanent member of the Organization of Antarctic Treaty Signatory Nations. The PAN realized the discussed projects in collaboration with many institutions and ministries.

Scientific tasks, especially preparatory tasks for the pioneer expeditions to the southern ocean in the region of the South Shetland archipelago, were assigned to the navy..

Doc Dr Stanislaw Rakusa-Suszczewski was the director of the first PAN polar expedition, and Franciszek Wrobel was his deputy for maritime affairs.

The first expedition achieved its intended goal and many organizational and technical successes were noted. It was recognized for its achievement by the authorities of the PAN administration and the Ministry of National Defense. For constructing and activating the H. Arctowski Antartic Station on King George Island in the record short time of 47 working days, the station's construction crew was received by Edward Gierek, first secretary of the PZPR Central Committee, and Prof Henryk

Jablonski, chairman of the Council of State of the Polish People's Republic, in recognition of their achievements. At the meeting, E. Gierek said, among other things, "I thank all participants of the expedition and the concerned ministries, the people of the sea, especially the navy, for their participation in organizaing the first Polish Antarctic expedition, its successful trip and achieved scientific results." Comrade Gierek also mentioned the great significance of the Antarctic expedition for Polish science and the nation's economy, stating that it was necessary to continue and expand scientific research in all polar disciplines.

The PAN administration expressed many times their warm thanks to the navy officers: Admiral Ludwik Janczyszyn and his deputies, Rear Admirals Ludwik Dutkowski, Henryk Piotraszkiewicz and Zygmunt Rudomin, for their help in realizing the polar program.

Several navy officers and noncommissioned officers were awarded high national honors by the Council of State for their contributions, inventiveness and special services in preparing the First Polish Antarctic Station expedition.

The experiences of the First Antarctic expedition made it possible for the PAN to prepare the scientifically and economically significant long-term polar research program "A Program for Antarctic and Arctic[water] Research as a Basis for Exploring and Protecting Its Natural Environment for the 1977-1980 Period," prepared in 1977 with a lead time up to 1990, which was recommended for realization as an interministerial program by Council of Ministers Resolution No 173/77 of 29 November 1977. Over 40 scientific centers participated with the PAN and various ministries in realizing this program. The extensive research program required the services of many specialists in various polar technologies, personnel from the commercial maritime fishing fleet, dockers, construction workers, maritime economy specialists and the like. On the strength of the cited resolution, the navy was obligated to provide special equipment and technical-port facilities, assign a hydrographic ship to explore the geography of the polar sea areas, to provide medical services for the expeditions and the PAN polar station, and to provide assistance in many other undertakings in which the safety and proper operation of the already operating polar stations depended.

To the present time, six expeditions have been made to the Antarctic region. The primary objects of these expeditions were:

The PAN H. Arctowski Station on King George Island (Expedition I: 29 December 1976 to 17 May 1977, director--Doc Dr Stanislaw Rakusa-Suszczewski, deputy for maritime affairs--Franciszek Wrobel; Expedition II: 20 November 1977 to 25 April 1978, director--Doc Dr Maciej Zalewski, deputy for maritime affairs--Roman Firlej; Expedition III: 5 November 1978 to 15 May 1979, director--Doc Dr Stanislaw Rakusa-Suszczewski, deputy for maritime affairs--Marian Spera; Expedition IV: 8 November 1979 to 4 May 1980, director--Doc Dr Andrzej Wyrcha, deputy for maritime affairs--Ryszard Ulamek).

The A. B. Dobrowolski East Antarctica Station (Expedition I: director--Doc Dr Wojciech Krzeminski, deputy for maritime affairs--Engineer Z. Kowalewski; Expedition II: in preparation).

The waters of the western Antarctic (1 December 1979 to 4 April 1980, director--Doc Dr Aleksander Guterh, deputy for trip affairs--Franciszek Wrobel).

ome attention should be devoted to this last expedition, and it should be acknowledged that its success and scientific results are closely linked with the hydrographic ship Kopernik and its crew. During the 4-month trip, this ship traveled over 40,000 km, the first ship in the history of the People's navy to reach the South Polar Circle. In the Antarctic region, the ship's crew performed research and measurements over 80 $km^2$ of area, exploring this extremely difficult area of the Antarctic to navigate. During the voyage in Antartica's waters, the ship, with two Argentine scientists aboard, paid a working visit to four Argentine scientific stations. On the return trip to Poland, the Kopernik visited the Argentine port of Buenos Aires. It should be emphasized that this visit produced many positive political aspects for the overall success of Poland's Antarctic research program. The ship's crew represented our socialist fatherland in a dignified manner, not only on the waters of the Antarctic but also in Argentina and along the way in the ports of Dakar and Las Palmas.

In preparation are future expeditions to the Antarctica Arctowski and Dobrowolski stations and a PAN biological ocean expedition using the ship Professor Siedlecki, which will represent our country and the Polish polar program in the international ecological-biological service in the waters of the Antarctic. The purpose of the BIOMASS Program is to determine the amount of krill and fish in this region, goals that are compatible with theneeds of our economy.

The results of Poland's activities in the realization of the polar research program are:

1. As of 1 July 1977, Poland became the 13th fully legal signatory-participant in consultative meetings of the Antarctic Treaty countries. This fact is of great significance regarding Poland's participation in decisions relating to the future and industrial exploitation of the Antarctic region with regard to mineral wealth and living resources.

2. PAN's research activities in the polar regions allowed Poland to strengthen collaboration with other countries conducting research in the Antarctic regions, especially with Argentina.

3. Research activity to date has proven that the polar regions are already, and can become to a greater degree, a source of food and raw materials for Poland.

4. During the course of the research work conducted at the polar stations and on the expedition ships, in addition to the scientific results, the results of the observations of hydrological, metrological and hydrographic conditions for marine and air navigation in the polar regions have been studied and partially developed for practical applications. Much information has been gathered for polar construction. Much material has been developed concerning the problem of adaptation of human organisma under polar conditions.

Poland's expanded polar research efforts during the 1981-1985 period will concentrate on those four main areas which have already been approved by the highest party and government leaders.

On the 35th anniversary of our armed forces, we can take pride in the fact that Polish mariners were even present in this difficult area of the globe.

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